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(54) Modular cage

(57) A modular cage for poultry comprises a body having flat or curved faces, at least four of such faces being made of a grid, one of said faces forming a front face 3 which can either have a hinged or sliding door 10, the modular cage being connected to an adjacent modular cage by outer flanges 14 held under pressure by compression-rods that can either be external to the modular cages or passing through holes 19 within the cage. The body has an open side. The lower floor 2 of the modular cages is frontwardly sloping to enable eggs, which have been laid by poultry within the cages, to fall into a horizontal conduit 4.

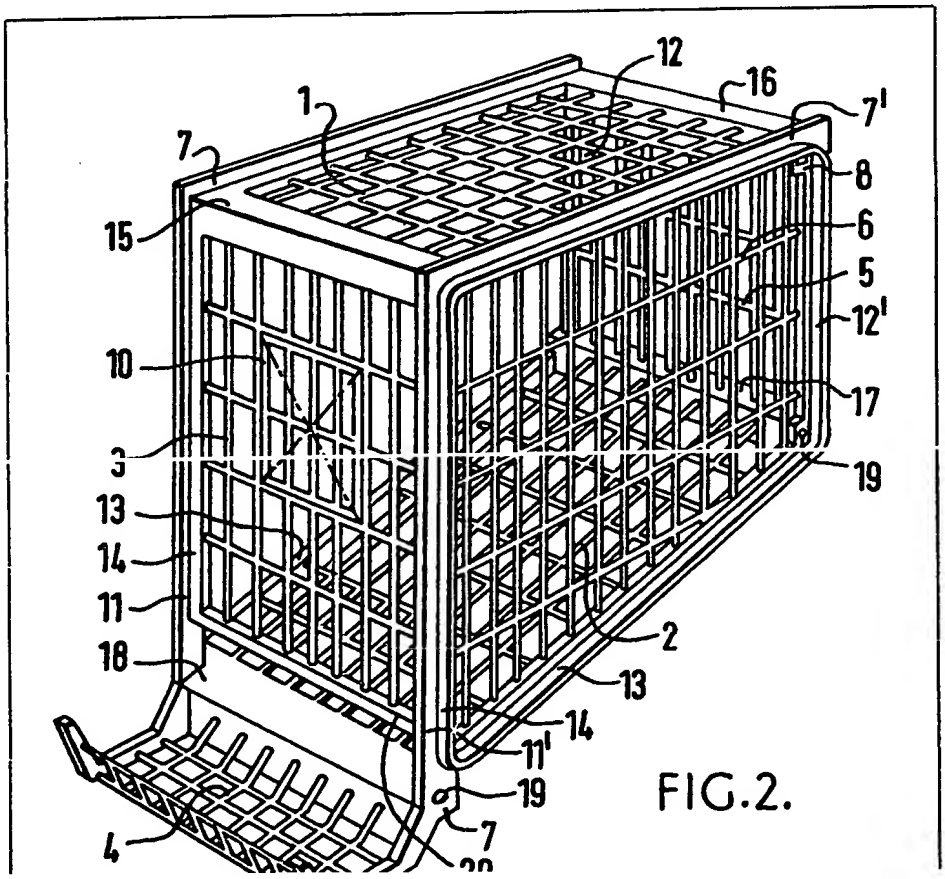

FIG.2.

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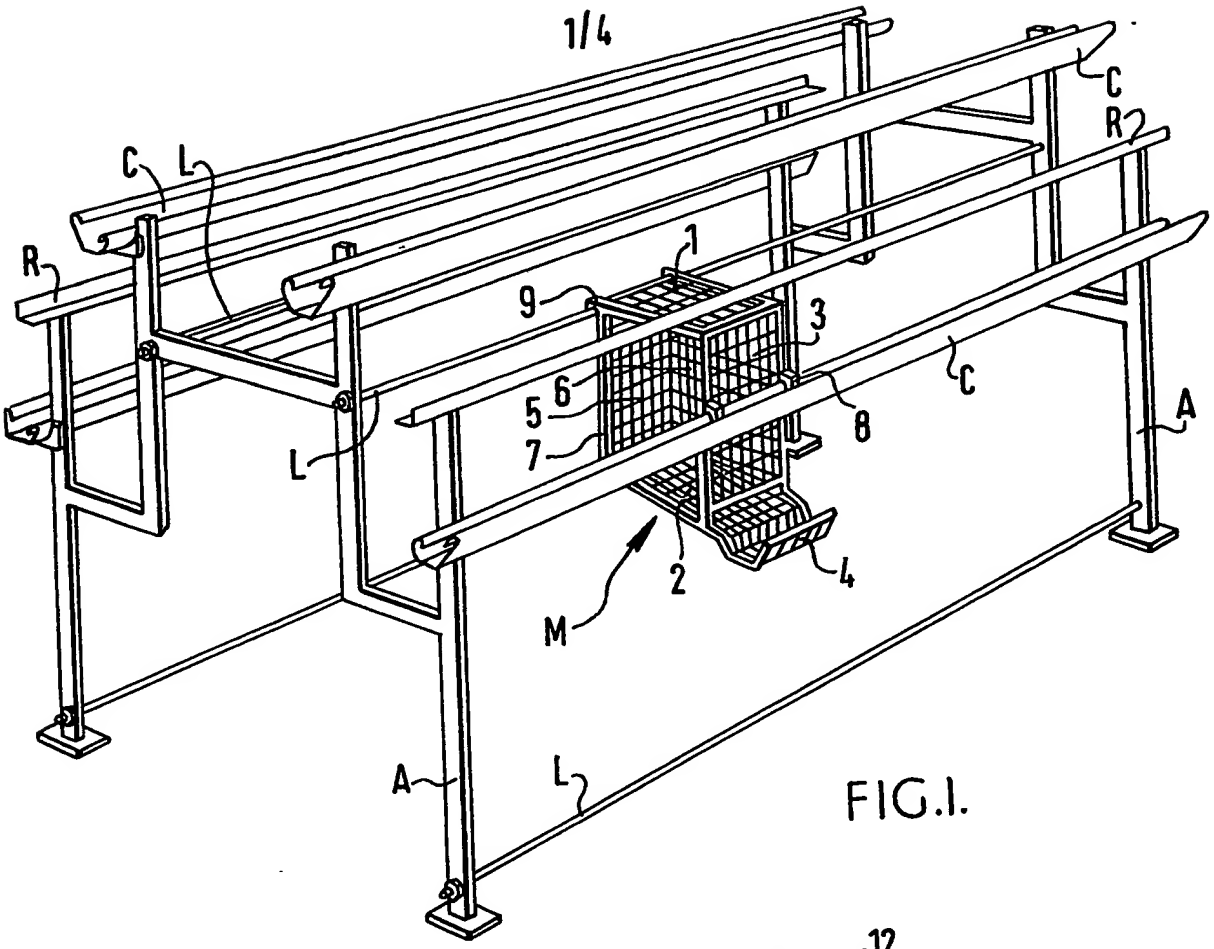
C
L
R
1
9
3
C
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5
6
8
A
7
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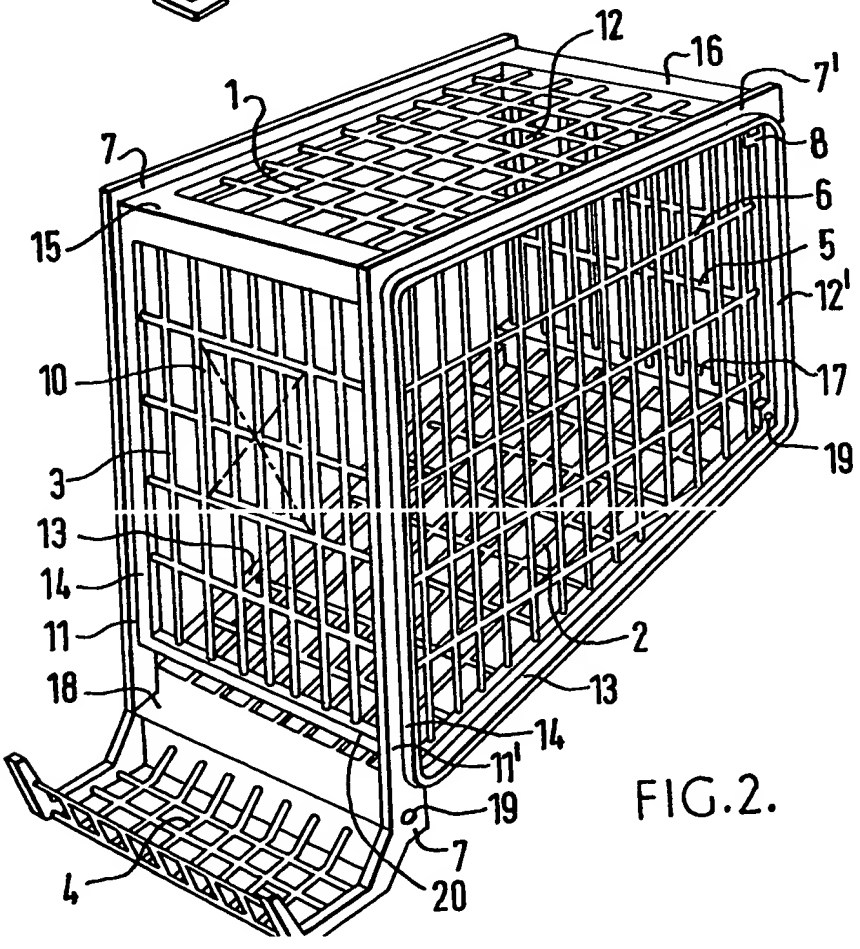
2
4
M
A
L

FIG.1.


12
16
7'
1
7
8
6
15
5
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17
19
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14
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19
7
4
20

FIG.2.

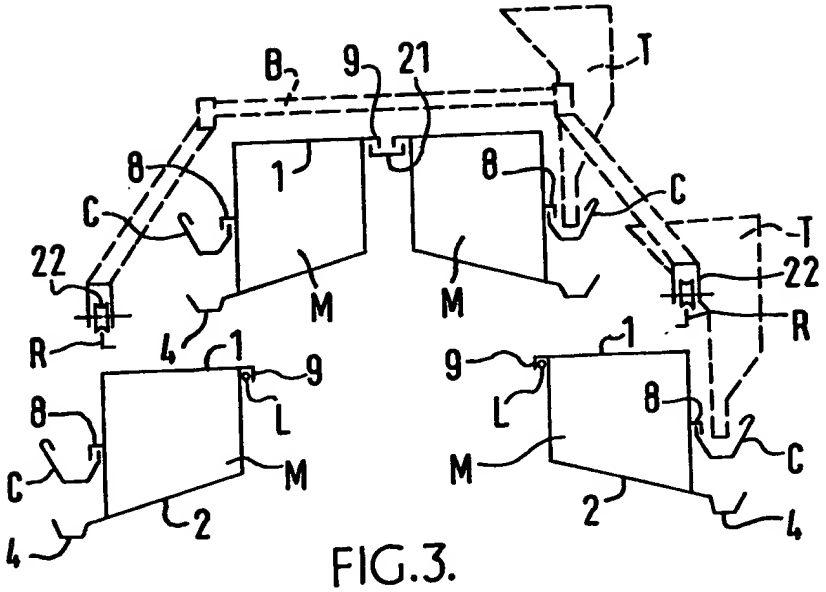


FIG.3.

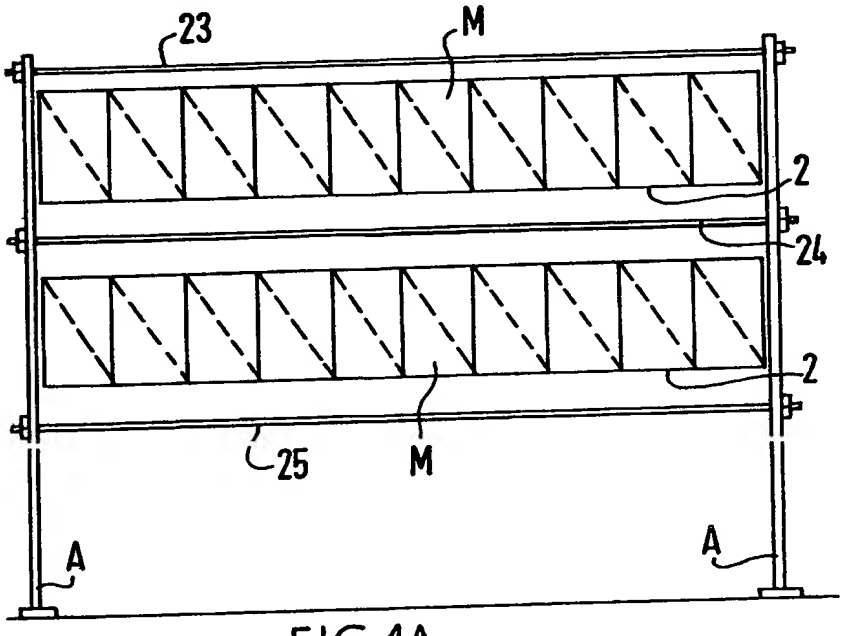
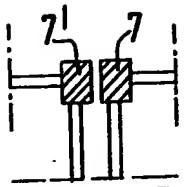


FIG.4A.



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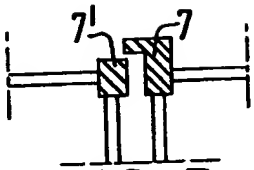

FIG.4D.

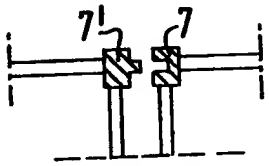

FIG.4C.

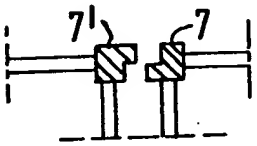

FIG.4E.

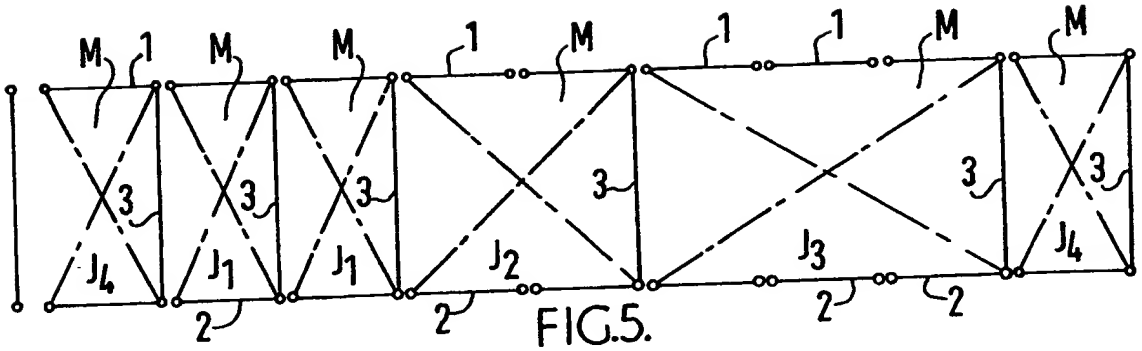

FIG.5.

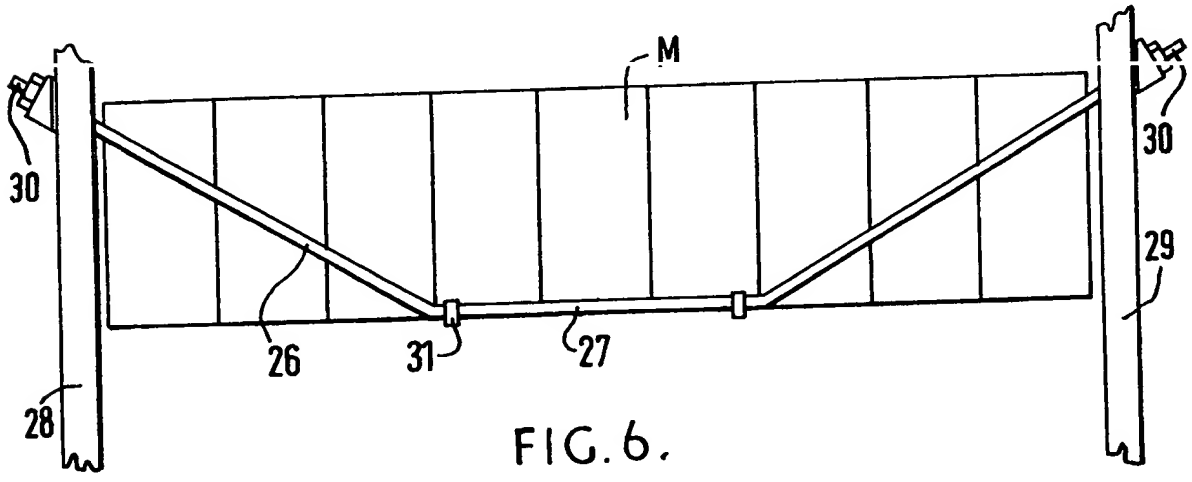

FIG.6.

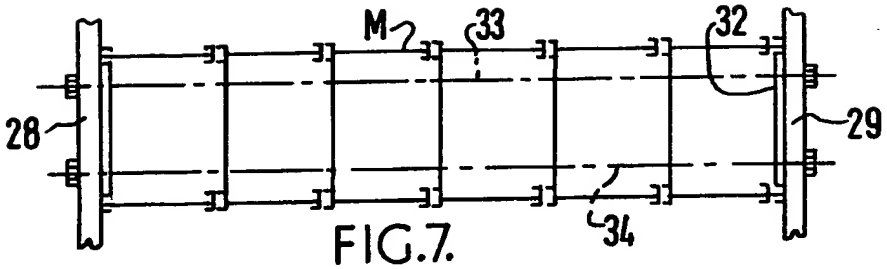

FIG.7.

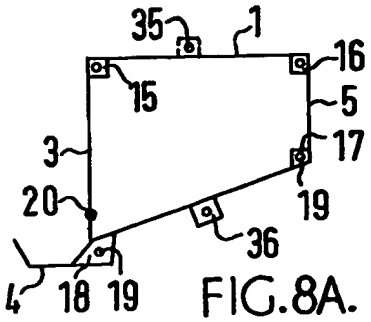

FIG.8A.

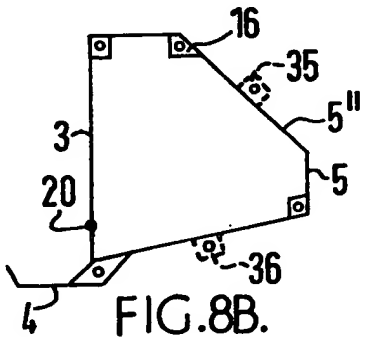

FIG.8B.

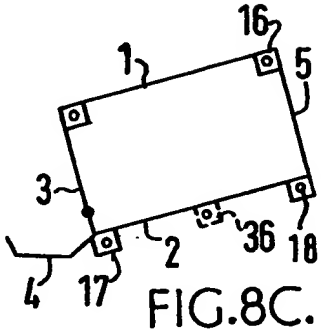

FIG.8C.

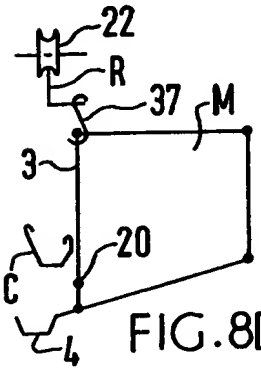

FIG.8D.

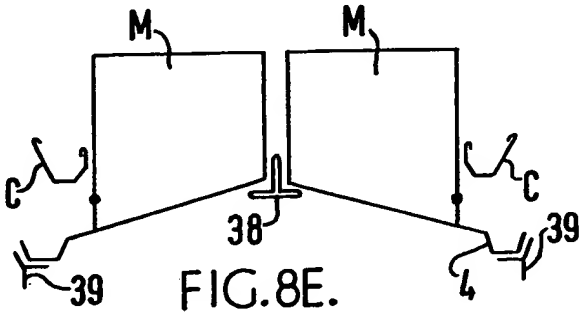

FIG.8E.

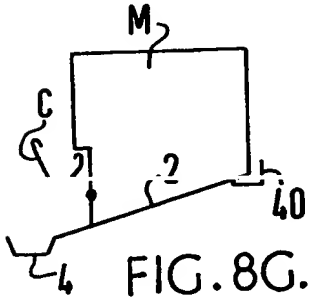

FIG.8G.

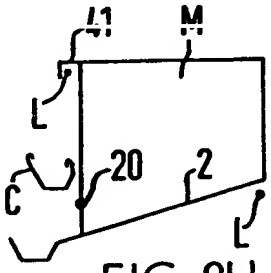

FIG.8H.

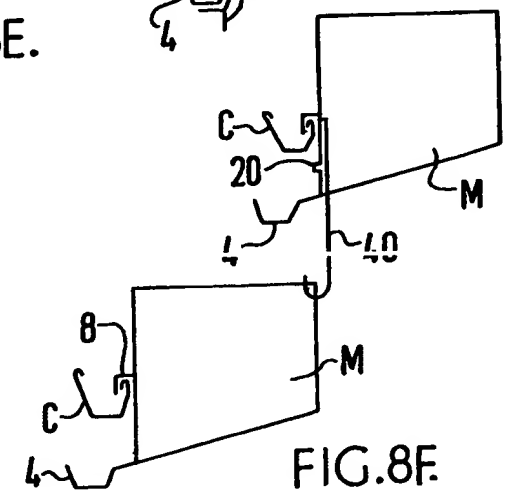

FIG.8F.

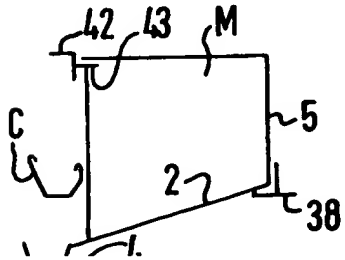

FIG.8I.

SPECIFICATION

Modular cag

The present invention relates to a modular cage for layers, such as poultry, domestic fowls, breeders or the like, and also for other small farm animals such as rabbits or the like.

Previously, cages were built with wire mesh, and it was possible to keep approximately four hens per cage. Generally, the cages were arranged in groups of up to ten. It was possible to manage them in rows, one after the other, on support structures of different kinds, which were particularly suitable to support several rows in several overlapping levels, generally extending along a barn from one end to the other. In these conventional applications, in order to facilitate the erection of the cages, the meshes for each group of up to ten cages were prepared in a factory, because it was necessary to pre-shape the wire meshes by, for example, bending. It was also necessary to provide separate joining means to assemble and fix the several parts, such as floors, roofs, front and rear walls. The cages were thus built in the way required for collecting eggs, feeding, watering, cleaning etc.. The wire mesh used was about three metres long, and about one metre wide. Care had to be taken when handling and transporting the wire meshes, and specific tools were required to fold the mesh and make the necessary connections to build the cages in each group. The wire mesh was usually distorted during the erection of the cages, especially when a large amount of mesh was handled.

Up to the present time, cages, which were made of wire mesh, have been exposed to various factors that effect their useful life. This is because the wire mesh is made of iron, which is easily damaged by, for example, acids contained in the guano of animals contained within such cages. Besides, hens are restless and not very clever, and it is frequently necessary to twist the wire mesh in order to free the head of any hen trapped in the mesh. Hens often die in their efforts to release themselves from the wire mesh, all of which obviously effects the mesh. Of course, wir m sh cages easily rust, owing to, amongst other things, disinf ctant action. The cages ar k pt cl an by th friction of th hens' f ath rs, which produce a similar ffect to lubrication. It is also noted that wh n ver the cages remain empty for som time, they easily rust and become useless.

In addition to all the above-mention d disadvantag s, it has be n proved that wire cages are not recoverable, in that the material they are made up from cannot be used to ment for the material required.

The new techniques developed to use plastics in the industrialization of many kinds of products have gradually solved many previously known disadvantages, especially in connection with wire mesh cages. However, in this field, no plastic realizations similar to the former ones have been obtained. Some of the alternatives include injection moulded panels but these require complicated erection conditions and their application is limited, since they need expensive and complex structures.

The present invention sets out to use plastics in a competitive and satisfactory way, profiting from the advantages of these materials, and sets out to solve the aforesaid disadvantages. The present invention further sets out to solve the problem of size and power of the injection moulding machines necessary for the manufacture of the cages. In fact, the injection moulding of plastics panels having the same size than the aforesaid metal meshes, and the use of similar techniques for the erecting of such cages require very large machines with high power output. It is probable that no such machines exist in the world.

However, the present invention sets out to manufacture modular cages using injection machines with less requirements than those previously used.

According to the present invention, there is provided a modular cage which comprises a prism-like body having flat or curved faces, at least four of such faces being made of a grid, one of said faces forming a front face which can either have a hinged or sliding door, the modular cage being connected to an adjacent modular cage by outer strips held under pressure by compression-rods that can either be external to the modular cages or passing through longitudinally extending holes within the modular-extending modular cages, the prism-like body having a horizontal axis and two equal opposite sides vertically disposed, one of such sides being open, and the lower side of the modular cages being frontwardly sloping to enable eggs, which have been laid by poultry within the cages to fall into a horizontal conduit adapted to receive such eggs.

Preferably, the prism-like body is made by injection moulding.

The invention will now be described by way of exampl with r ferenc to the accompanying drawings, in which

Figure 1 is a perspective view of a modular cag according to the invention, supported by a conventional structure;

Figure 2 is a perspective view in a larger scale of a modular cage similar to that shown in Fig. 1;

Figure 3 is a schematic levational vi w of

supplying conduits with food for the poultry or other animals kept in the cag s;

Figure 4A is a longitudinal elevational view of the support structure for supporting the modular cag s;

Figure 4B–4E show alternative constructions for connecting together adjacent modular cages;

Figure 5 shows an arrangement of modular cages grouped together;

Figure 6 is a reverse view of a row of modular cages;

Figure 7 shows a row of modular cages held together by longitudinally extending tension-rods; and

Figures 8A–8I show several alternative structures of the modular cages.

Fig. 1 shows a conventional structure, which is used to support wire cages, where ach row of cages includes several units having a common floor from one end to the other of the group, a common rear wall, roof and front wall, and intermediate partitioning walls fixed to the floor, roof and walls. The structure comprises vertical upstanding framework members A and beams, such as girders or horizontal tension-rods L placed perpendicular to them. The end portion of each beam is secured to a vertical member A. The structure also comprises conduits C which are used to supply animals kept in the cages with food; the conduits are also used to interconnect the vertical members A. The structure also has rails R for stability purposes, which also guide and hold a movable frame (not illustrated) which supplies food to the conduits C. A modular cage M is placed on the structure and can be arranged in a row between two adjacent vertical members A.

The modular cage comprises a prism-like body having a frame 7 and horizontal axis and an upper face 1, which is a grid, a floor 2, which is another grid sloping frontwardly, a front wall 3 extending towards an opening, whereby eggs can be dropped into a receiving conduit 4, a rear vertical wall 5, and a side vertical wall 6, corresponding to the grid on one side of the prism. The other side side, parallel to the side vertical wall 6, is completely open and is defined by a frame 7. In this embodiment of the modular cage, the front wall 3 has two hook-like devices 8 located at the front of the cage, and two other hook-like devices 9 located at the rear of the cage, the front devices 8 engaging one of the conduits C and the rear devices 9 engaging one of the tension-rods L.

Fig. 2 shows in a larger scale a modular cage according to the invention. The modular cag has a roof grid 1, a floor grid 2, a front wall grid 3, a sid wall grid 6, a r ar wall grid 5, an egg-receiving conduit 4, an dge 7 of th pen side, and a door 10 in the front wall reinforced by thin bars or bars thicker than the grid rails. The cage has upper horizontal edges 7 and 7′, front vertical edges 11 and 11′, rear vertical edges 12 and 12′, and lower forwardly sloping edges 13 and 13′. There is also a flange 14 which stands proud of the frames, the flange 14 being adapted to engage with a frame of an open side of an adjacent cage, thereby forming a connection between two adjacent cages.

Fig. 2 also shows cross-braces comprising enlargements of the edges 15, 16 17 and 18, which are perpendicular to the frames.

Each cross-brace has a longitudinal hole 19 to allow insertion of a steel compression-rod, which is then tightened by tightening means, for example, nuts to keep the group of modular cages of one row duly compressed. A side face of each modular cages engages a side face of an adjacent modular cage, as shown in Figs. 4, 5, 6 and 7.

Fig. 2 also shows that the front wall grid 3 terminates in a crosspiece 20. There is an opening beneath the crosspiece, whereby eggs laid by hens contained within the modular cages are dropped into the collecting conduit 4.

In an alternative embodiment, the egg-collecting conduits can be independent devices, attached to the cages. As a further alternative embodiment, the front wall grid from the crosspiece 20 can form a separate unit that may be used as a hinged or removable door.

The modular cage can also incorporate reinforcement crosspieces which are parallel to the aforesaid horizontal edges. The reinforcement crosspieces can be arranged in the middle of each wall grid. A suitable distribution of the compression-rods and their proper adjustment means that other types of securing or engaging means can be avoided. In the embodiment shown in Fig. 2, the connection formed by the flange 14 and the frame 7 makes it unnecessary to use additional securing or engaging means, such as hooks as shown as 8 and 9 in Fig. 3.

Fig. 3 shows schematically modular cages M which are supported by the hooks 8 and 9, the hooks 8 engaging the conduits C which supply food to the animals and the hooks 9 engaging the rear longitudinal pieces 21 or inner beams L, as the case may be. Fig. 3 also shows in broken lines food-supplying hoppers T, which are repeated at both sides to reach the two front rows of cages. The hoppers are carried by a movable frame D (not shown) which lies on wheels 22 that run on the rails R.

Fig. 4A shows modular cages M arranged in horizontal rows between two vertical members A. The compression of the compression-rods 23, 24 and 25 is adjustable by nuts, adjusting keys, or springs. Fig. 4B shows the

each other through two flat strips that press against each other due to the compression of the compression-rods. Likewise, the edges may have different s ctions, so that different types of connections can be formed, as shown in Figs. 4C–4E.

Further groups of modular cages can be built, always related and in horizontal rows, either by connections or under pressure using bars or compression-rods or attaching them to the structural elements. There may be a different number or size of cages, as shown in Fig. 5, where it can be seen that by cutting off some sides 3 simple cages J1, double cages J2 or triples cages J3 can be obtained. The limitation as regards their distribution will be in accordance with the needs of the farm.

Fig. 6 shows a row of modular cages M seen from the rear, including a compression-rod comprising sloping and horizontal sections 26 and 27 respectively. The rod extends between two opposite surfaces 28 and 29 or, as shown in Fig. 4A between two adjacent vertical members A. The rod includes adjusting means 30, controlled at each end of the rod. The modular cages which are supported at the rear, once compressed form a beam which is resistant to bending. They can also be linked to the compression-rods by handles or clamps 31 (as shown in Fig. 6).

The group of modular cages M shown in Fig. 7 have a terminal plate 32 or a wall 6, which closes the open side of the last cage in a row of cages. The group is kept together by internal compression-rods 33 and 34, which can be fixed by nuts, etc. to two opposite surfaces 28 and 29, or otherwise to frames equivalent to the respective vertical members A. The compression-rods pass through the holes provided in the cross-braces of each modular cage. They may also pass through outer loops attached to the modular cages.

Figs. 8A–8I show schematically various alternative modular cages for different users' requirements and different kinds of application. Fig. 8A shows a modular cage with cross edges 15, 16, 17 and 18 of large section, similar to the those shown in Fig. 2. The modular cage includes some other crosspiece reinforcements 35 and 36, which are preferably arranged on the outside of the cage to avoid harming poultry or animals within the cag s. All such reinforcements are provid d with longitudinal holes for the installation of compression-rods.

Fig. 8B shows a modular cage with a diff rent shape having the rear wall in several s ctions 5′ and 5″. It is also possible to include reinforc ments 35 and 36 arranged in the middle of a wall grid, whilst the edge can be reinforced as shown at 16. Fig. 8C shows th roof 1 parall l t the flo r 2 and includ s attached to the rail R on which the wheel 22 runs. Stability is achieved by leaning against the conduit C. Th eccentricity of the hanging d ivce produces a tendency to bend clockwise, but this can be avoided by contact with the conduit. Fig. 8E shows the modular cages M in two rows as shown in Fig. 3. The modular cages are supported by long T-shaped pieces 38 which are inverted, and by similar suitable pieces 39, in which the conduits 4 fit.

Fig. 8F shows the modular cages M of a lower row hanging by hooks 40 from the conduits C of the upper modular cages. The cages have hooks 8 which engage the lower conduits C as already explained. Fig. 8G shows how the modular cages M lean at the front against the conduit C, and how they stand on long devices 40 at the rear, the device 40 stretching along the framework.

Fig. 8H shows the modular cage supported by bars L, so that, at the front, the hooks 41 engage the bar L whilst at the rear, the rear edge of the floor 2 engages the bar L. Finally, Fig. 8I shows another embodiment which comprises long structural pieces 42 which are positioned between the framework. Pivots 43 are arranged on the pieces 42, so that the modular cages M can be attached to the pieces 42. The rear of the modular cages are supported by other structural pieces 38.

It can therefore be seen that this invention provides an advantageous way of using plastics material in the application of building modular cages, which can be connected together in groups. Apart from avoiding the disadvantages which occur with the use of wire mesh cages, the modular cage has many other advantages. Firstly, the modular cages can be built in smaller sizes, thereby making transportation easier, versatility in the size of barns where the modular cages are to be installed, speed in the erection, of the cages and a possibility of reusing the material when building new modular cages.

CLAIMS

1. A modular cage for poultry comprising a prism-like body having flat or curved faces, at least four of such faces being made of a grid, one of said faces forming a front face which can either have a hinged or sliding door the modular cag b ing conn cted to an adjacent modular cage by outer flanges held under pr ssure by compression-rods that can either be ext rnal to the m dular cages or passing through longitudinally extending holes within th modular-extending modular cages, the prism-like body having a horizontal axis and two equal opposite sides vertically disposed, ne of such sides being open, and the lower floor of the modular cages being

ceive such eggs.

2. A modular cage as claimed in claim 1, wh rein structural reinforcements are included to resist m chanical action in som of the side faces parallel to the axis of the prism-like body.

3. A modular cage as claimed in claim 1, wherein the modular cage has fixing means which are disengageable from a support structure.

4 A modular cage as claimed in claim 1 or 2, wherein the structural reinforcements comprises crosspieces perpendicularly arranged between the edges of the sides of the prism-like body, the prism-like body having longitudinal holes capable or receiving rods extending throughout a number of similar modular cages arranged in a row, and the rods having fastening adjustable means.

5. A modular cage as claimed in claim 1, wherein the grids corresponding to one of the sides, the roof, the floor, the front and rear faces of the prism-like body are flat.

6. A modular cage as claimed in claim 1, wherein the edges corresponding to the perimeter of the sides and vertical opposite faces of the prism-like body and perpendicular to the axis are flat straight strips uniform in width.

7. A modular cage as claimed in claim 1 or 2, wherein the structural reinforcements of the side faces parallel to the prism-like body axis are longitudinally extending solid rods of the same material as the prism-like body.

8. A modular cage as claimed in claim 1 or 2, wherein the structural reinforcements of the side faces parallel to the prism-like body are transversely extending rods of the same material as the prism-like body.

9. A modular cage as claimed in claim 1, wherein the edges corresponding to the perimeters of the sides and opposite faces perpendicular to the prism-like body axis have connecting devices.

10. A modular cage as claimed in claim 1, 2 or 4, wherein the structural reinforcements support axial mechanical action are thicker sections parallel to the prism-like body axis, and lie between the edges of the sides, defining horizontal reinforced edges.

11. A modular cage as claimed in claim 1 or 3, wherein the fixing means which are disengageable from the support structure are compr ssion-rods p rpendicularly placed between two v rtical m mb rs forming part of th structure, the rods compressing the set of modular cages in a horizontal row between said vertical m mbers, and the compressionr ds being supplied with adjusting means.

12. A modular cage as claimed in claim 1, 3 or 10, wherein the fixing means comprise compression-rods lying between the vertical member and passing through longitudiing supplied with adjusting means.

13. A modular cage as claimed in claim 1 or 3, wherein the fixing means comprise support devices in at least one of the outer fac s of the prism-like body and directly engage longitudinal pieces of the structure, the pieces being chosen from horizontal compression-rods beams, rails and conduits.

14. A modular cage as claimed in claim 1 or 3, wherein the fixing means comprise hanging pieces which engage horizontal long pieces of the support structure.

15. A modular cage as claimed in claim 1 or 3, wherein the fixing means comprise supports arranged at least in one of the front or rear faces, the supports being capable of engaging compression-rods having sloping sections lying between two vertical members of the support structure, so that some of the modular cages depend from the compression-rods.

16. A modular cage as claimed in claim 1, 3, 6 or 11, wherein the fixing means comprise compression-rods extending between opposite terminal sides of a group of modular cages belonging to a horizontal row which operates as a single multiple independent unit of cages acting as a beam.

17. A modular cage as claimed in claim 3 or 11, wherein at least part of the compression-rods passes through the holes in the closed face of one of the sides perpendicular to the axis of the modular cage.

18. A modular cage substantially as herein described with reference to and as illustrated in the accompanying drawings.

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